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ABSTRACT

To examine the proportion of variance in adaptive functioning predictable from mental ability, chronological age, I.Q., evidence of brain malfunction, seizure medication, and receptive and expressive language scores, 25 severely and profoundly retarded institutionalized persons (2-19 years old) were administered the Bayley Infant Scale Mental Scale. Variables were entered as predictors in a standard multiple regression analysis, and criterion variables were obtained from independent ratings on the Behavioral Characteristics Progression scale in the areas of motor development, auditory perception, drinking, dressing, undressing, oral hygiene, toilet hygiene, and interpersonal skills. Results indicated that the predictors were significantly able to predict the adaptive behaviors, except for feeding. (Author/CL)

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Predicting Adaptive Behavior from the Bayley Scales of Infant Development

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No one would deny that behavior modification technology has had a positive impact on the care and instruction of retarded children and adults. In the case of EMR's and TMR's immediate and continued improvements in adaptive behavior are readily achieved. The research literature on successful behavior modification with profoundly and severely retarded individuals is necessarily less established due, in part, to the smaller number of available subjects, and to the greater difficulty of achieving short term and continuous observable improvements. Nevertheless, it is not uncommon for behavior modification enthusiasts to imply (in articles and in workshops) that their techniques are quite effective when applied to any population. In some instances, authors who describe the success of certain programs fail to specify the intellectual levels of their subjects. In others, the subjects' I.Q.'s may be given, but chronological and mental ages omitted. Occasionally, an author will assess the relationship between the success of his technique and the I.Q. of his subjects. In one such study (Gold, 1973), it is reported that the ability of retardates to learn to assemble bicycle brakes is unrelated to I.Q.

The observations of the authors during several years of consulting at a training institution for the profoundly retarded have been somewhat different. We have seen dedicated behavior modification trainers struggling with profoundly

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and severely retarded children, and meeting with some success, but often feeling defeated or incompetent when progress was slow or nonexistent. The discrepancy between their expectancies (created by workshops, films, etc.) and their actual successes, is often a source of frustration and disenchantment. Sometimes they return from a behavior modification workshop convinced that the intellectual limits of the subject are inconsequential; that a failure to learn, even in profoundly retarded subjects, is the result of their own limitations rather than the trainee's.

Recently, B. F. Skinner (1975) has acknowledged the limitations of the organism in behavior modification procedures. Although Herrnstein (1977) and Skinner (1977) have debated whether Skinner has always held this position, Skinner maintains that he has always recognized that the capacity of the organism determines the degree of behavior change possible. Certainly few people today would endorse Watson's grandiose claim, "Give me a dozen healthy infants...". Still, either intentionally or otherwise, behavior modification proponents manage to create unrealistic aspirations in their readers and workshop participants, and tend to minimize the worth of I.Q. tests, developmental measures, and other scales which attempt to predict success in learning situations (eg. Gold, 1975).

The purpose of the study was to investigate whether the Mental Age or Developmental Index score of the Bayley Infant Scales would be predictive of adaptive behavior in profoundly and severely retarded children. Together with M.A., we included C.A., I.Q., evidence of gross brain malfunction, seizure medication, receptive language score and expressive language score as predictors in multiple regression equations with various adaptive behavior levels as criteria. The same predictors were used with the following nine criteria: motor development,

auditory perception, feeding, drinking, dressing, undressing, oral hygiene, toilet hygiene and interpersonal skills. Each of these adaptive behaviors was measured by the Behavioral Characteristics Progression assessment tool.

Method

Subjects: Subjects were 25 profoundly and severely retarded persons in a state operated training facility committed to short term behavior modification training. The children are in training programs several hours a day. The subjects ranged in chronological age from 2 years 5 months, to 19 years 10 months. The mean age was 9 years 3 months. The M.A.'s ranged from 5 months to 29 months with a mean of 17.7 months.

Measures: The Bayley Infant Scale, Mental Scale was selected since it provides a Mental Age measurement from one week to 30 months. Two psychologists administered the test, one managing the child and the other the testing kit. Decisions as to attainment of criterion on specific items required agreement by both examiners. Mental Age or D.I. was obtained by Bayley's procedures. An I.Q. approximation was determined by the formula MA/CA X 100. The obtained I.Q.'s ranged from 3 to 62, with a mean of 19.6.

The Behavior Characteristics Progression assessment tool was administered by the Behavior Modification Supervisor. It was given independently of the Bayley and without the administrator of the B.C.P. being aware of the purpose of the study. The B.C.P. was administered in Motor, Auditory Perception, Feeding, Drinking, Dressing, Undressing, Oral Hygiene, Toilet Hygiene and Interpersonal Skills. These scales allow for behavioral measurement arranged in small progressive steps. The scale is used to determine baseline and level of progress in behavioral training.

Diagnosis of gross brain malfunction and seizure medication prescribed was obtained from the children's cumulative folders. Receptive and Expressive language ratings were made from reports of the Speech Therapist concerning the present language competencies of the child.

Results

Pearson product-moment correlations were computed between all B.C.P. scores for each child and each predictor variable (Table 1). It can be observed that M.A. is a highly significant predictor of every adaptive behavior ($p < .01$). I.Q. is a significant predictor in 6 cases. All the other predictors are significantly related to some of the 9 criteria in 4 or 5 instances.

Standard multiple regressions indicated that the seven predictors significantly predict the adaptive behaviors in 8 of 9 instances. Only the feeding behavior score was not predicted. In 7 of 9 cases, M.A. is a significant unique predictor within the regression equation, accounting for the greatest amount of specific variance. C.A. is a unique predictor in 2 regression equations and the Language Measures are unique in one equation.

Discussion

M.A. score as measured by the Bayley, predicts a meaningful proportion of the variance in the acquisition of adaptive behaviors by profoundly and severely retarded children. For every behavior, M.A. was the best single predictor of the seven investigated. In all instances, however, the other predictors in the regression equation added to the total explained variance. The R^2's, ranged from .49 to .79 with a median value of .64. Using Darlington's (1968) usefulness or uniqueness index, M.A. was found to contribute to a significant gain in R^2 for 7 of the 9 regression equations.

The lack of significance for the regression equation on Feeding behavior is probably due to lack of variability in the criterion. All the children are taught to eat with a spoon and since eating is such a primarily rewarding task, even the children with M.A.'s of 6 or 7 months acquire this skill after some training; the staff is satisfied with proper spoon feeding behavior and does not pursue the finer refinements of table manners and use of other utensils. The B.C.P. scores for feeding showed that 21 of 24 children achieved a score of 20 which is the level of spoon feeding.

It is important to note that M.A. is generally a better predictor of functioning than is I.Q. It is more highly correlated individually with the criterion, and contributes more in a multiple regression equation. Indeed, the Bayley M.A., by itself, is just about as good as all seven predictors in combination in most instances. Where time or resources are limited, a strong case could be made for eliminating all predictors except M.A. This could account for Gold's (1973) finding of no correlation between I.Q. and success of training, and other such reports. If all subjects are the same chronological age, or are all adults, I.Q. would predict just as well as mental age since it would be mathematically equivalent. But where chronological age varies, and especially in children, mental age is considerably more relevant than I.Q. in predicting adaptive behavior. And even when brain damage is known to exist, M.A. is still more informative than the fact of their organicity, the drugs they take, etc.

This study indicates that the M.A. of a child has some practical implications concerning the limitations of behavior modification. Children with higher M.A. have achieved higher levels of adaptive behavior, even in the same setting with the same trainers, programs, and opportunities. Behavior modifiers dealing

with the profoundly and severely retarded, should always be cognizant of M.A. limitations of the child. Developmental Scales for normal children can be used as a norm, for ascertaining what a child might learn. But a person with an M.A. of 6 months, usually cannot dress or undress on command or take care of toileting needs unassisted, no matter how much reinforcement is given.

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Table 1: Zero-order and multiple correlations between 7 predictors and 9 adaptive behaviors
Predicting Adaptive Behavior from the Bayley Scales of Infant Development

Predictors:
A - Chronological Age
B - Mental Age
C - I.Q. score
D - Brain Damage Score
E - Seizure Medication Score
F - Receptive Language Score
G - Expressive Language Score

Motor Skill
Multiple R .82
R^2 = .67
F(7, 17) = 5.01**

	zero order r	R^2 gain
A	.41*	4.37**
B	.64**	11.62**
C	.40*	-
D	-.54**	-
E	-.40*	-
F	.22	-
G	.25	-

Auditory Perception
Multiple R = .76
R^2 = .58
F(7, 17) = 3.48*

	zero order r	R^2 gain
A	-.41*	-
B	.70**	-
C	.43*	-
D	-.21	-
E	-.29	-
F	.41*	-
G	.61**	-

Feeding
Multiple R = .70
R^2 = .49
F(7, 17) = 2.38

	zero order r	R^2 gain
A	.04	-
B	.67**	3.41*
C	.23	-
D	-.31	-
E	-.35*	-
F	.34*	-
G	.45*	-

Drinking
Multiple R = .74
R^2 = .55
F(7, 17) = 3.05*

	zero order r	R^2 gain
A	-.31	-
B	.63**	5.56**
C	.42*	-
D	-.31	-
E	-.24	-
F	.50**	-
G	.26	-

Dressing
Multiple R = .87
R^2 = .77
F(7, 17) = 8.32**

	zero order r	R^2 gain
A	-.05	-
B	.78**	27.40**
C	.17	-
D	-.42*	-
E	-.41*	-
F	.37*	-
G	.38*	-

Undressing
Multiple R = .88
R^2 = .79
F(7, 17) = 9.25**

	zero order r	R^2 gain
A	-.41*	6.91**
B	.75**	21.02**
C	.45*	-
D	-.55**	-
E	-.42*	-
F	.32	-
G	.33	-

Oral Hygiene
Multiple R = .80
R^2 = .64
F(7, 17) = 4.38**

	zero order r	R^2 gain
A	-.08	-
B	.62**	23.08**
C	.14	-
D	-.32	-
E	-.23	-
F	.14	3.93**
G	.22	5.58**

Toilet Hygiene
Multiple R = .82
R^2 = .67
F(7, 17) = 5.13**

	zero order r	R^2 gain
A	-.13	-
B	.74**	11.37**
C	.47**	-
D	-.37*	-
E	-.32	-
F	.27	-
G	.38*	-

Interpersonal Skills
Multiple R = .79
R^2 = .63
F(7, 17) = 4.21**

	zero order r	R^2 gain
A	-.38*	-
B	.72**	-
C	.54**	-
D	.40*	-
E	-.20	-
F	.44*	-
G	.53**	-

* $p < .05$
** $p < .01$